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**GREAT LAKES FORESTRY CENTRE**
**CENTRE FORESTIER DES GRANDS LACS**

# Results of forest insect and disease surveys in the CENTRAL REGION of Ontario, 1986

CARRIED OUT BY THE GREAT LAKES FORESTRY CENTRE IN COOPERATION WITH THE ONTARIO MINISTRY OF NATURAL RESOURCES

W. D. Biggs, R. J. Sajan and H. Brodersen
Miscellaneous Report No. 53

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# THE GREAT LAKES FORESTRY CENTRE

The Great Lakes Forestry Centre is one of six regional centres located across Canada and operated by the Canadian Forestry Service. The Service provides federal leadership and a national focus in the forestry sector for the continuing economic, social and environmental benefit of Canadians. The Centre conducts two major programs: research and technical services, and forestry development. Both programs address major problems affecting forest management and the forested environment in Ontario. Because of the transprovincial nature of the forest resource, many elements of the research program are of national significance.

For many years the research program was guided by the Canada-Ontario Joint Forestry Research Committee, made up of senior members of the Centre and the Ontario Ministry of Natural Resources. Responsibilities for coordinating all forestry research in Ontario have now been assumed by the Ontario Forestry Research Committee, which has representatives from forest industry, universities and federal and provincial governments. This Committee also ensures that research results are transmitted to forest managers.

Staff of the forestry development program negotiate and administer federal-provincial cost-sharing agreements with the province of Ontario, conduct economic studies, and assist in implementing job creation programs in the forest sector. This requires close cooperation with the Ontario Ministry of Natural Resources and with other provincial and federal agencies concerned with the forest sector.

The Centre recognizes that forested land must be managed in the best public interest, not only for the wood production essential to our economy but also for the recreational purposes that are so important to our social well-being. These goals must be achieved in a manner that will maintain or improve the quality of the forest environment and preserve it for generations to come.

# RESULTS OF FOREST INSECT AND DISEASE SURVEYS IN THE CENTRAL REGION OF ONTARIO 1986

(FOREST DISTRICTS: HURONIA, LINDSAY, CAMBRIDGE, MAPLE AND NIAGARA)

W.D. BIGGS, R.J. SAJAN AND H. BRODERSEN

GREAT LAKES FORESTRY CENTRE

CANADIAN FORESTRY SERVICE

GOVERNMENT OF CANADA

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## SURVEY HIGHLIGHTS

This report summarizes information gathered on various pests and abiotic damage found in the Central Region in 1986. This year H.J. Evans was transferred to the North Central Region. He now spends his summers working out of Thunder Bay and W.D. Biggs has taken his place in the Central Region.

In general, many of the insect populations remained at much the same level or were down in comparison with the levels of the previous year. Gypsy moth was an exception. Increased areas of defoliation were mapped in Lindsay District and many more moths were captured in the pheromone traps across the region. A special egg survey was carried out to forpopulations in the Huronia District and there it appears that this insect poses no threat in 1987.

Once again, a search was made for Scleroderris canker and again it was not found. Tip blight on Scots pine was still a problem in three districts and Septoria leaf spot caused extensive defoliation of balsam poplar across the region.

Eastern white pine was the focus of a special survey in 1986; a cone collection was made and various plantations were examined. The pinewood nematode was found in a red pine tree in Lindsay District and an examination of the acid rain plots revealed no sign of pollution-related damage.

If further information is required about pest conditions in the Central Region, please contact W.D. Biggs or write to the Head, Forest Insect and Disease Survey Unit, Great Lakes Forestry Centre, P.O. Box 490, Sault Ste. Marie, Ontario P6A 5M7.

*Major Insects or Diseases*

capable of causing serious injury to or death of living trees or shrubs

*Minor Insects or Diseases**

capable of causing sporadic or localized injury but not usually a serious threat to living trees or shrubs

*Other Forest Insects/Diseases (Tables)*

These tables provide information on two types of pest:

(1) those which are of minor importance and have not been known to cause serious damage to forest trees,

* No minor diseases were reported in the Central Region in 1986.

Frontispiece. Damage caused by redheaded pine sawfly, *Neodiprion lecontei* (Fitch)

(2) those which are capable of causing serious damage but, because of low populations or for other reasons, did not cause serious damage in 1986.

The cooperation and assistance provided by the Ministry of Natural Resources (OMNR), Agriculture Canada and other government agencies and individuals are gratefully acknowledged.

W.D. Biggs

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## INSECTS

### *Major Insects*

Pine False Webworm, *Acantholyda erythrocephala* (L.)

A general population decline has been noted for this insect over the past couple of years in the western half of the region, and the pattern continued this year. An exception to this general reduction was observed in Harvey Township, Lindsay District, where increased populations caused an average of 90% defoliation on 100% of the 3-m trees examined in a 20-ha red pine (*Pinus resinosa* Ait.) plantation. Trace defoliation levels, ranging from 1% to 5%, were observed on about 20 scattered 2-m red pine in the Boy Scout plantation at Canadian Forces Base (CFB) Borden, Huronia District, on 8% of the 12-m eastern white pine (*Pinus strobus* L.) in a 4-ha plantation in Clarke Township, Lindsay District, in an 8-ha red pine plantation in Melancthon Township, and in a small Scots pine (*Pinus sylvestris* L.) Christmas tree plantation in Essa Township, Huronia District. The insect was also found during a special survey in eastern white pine plantations in Cambridge District (see Special Surveys).

Cedar Leafminers, *Argyresthia aureoargentella* Brower,
*A. canadensis* Free., *A. thuiella* (Pack.)
and *Coleotechnites thujaella* (Kft.)

There was no change in the status of this complex of insects in the Central Region. Population levels remained at low levels, and most of the damage was found in the western portion of the Huronia District and the northern part of the Cambridge District. Before the new growth began on white cedar (*Thuja occidentalis* L.), noticeable browning was common on scattered trees and small stands in Adjala, Melancthon and Nottawasaga townships in Huronia District and in Erin, Arthur, West and East Luther townships in Cambridge District. Current damage was low enough that by the time the new foliage emerged later in the season, it was hard to tell that the trees had ever been damaged. Population levels were very low in the remainder of the region.

Oak Skeletonizer, *Bucculatrix ainsliella* Murt.

There were further declines this year in the insect populations that peaked in 1983. Outbreaks of this native insect have been recorded in Ontario since 1961. The early-instar larvae begin feeding by making tiny tunnels and/or blisters in the leaf surface. The third-instar larvae move to the underside of the leaf to feed on the two parenchyma layers, leaving the upper surface and rib system intact (hence the name skeletonizer). There are two generations per season.

A large number of affected black oak (*Quercus velutina* Lam.) trees were observed in Niagara District but, in most cases, defoliation levels were down from those of last year. The most notable damage surveyed was in a 3-ha woodlot in North Grimsby Township where 100% of the trees examined had an average of 30% foliar damage. A high incidence of attack was also found in Humberstone and Bertie townships, but defoliation levels averaged only 10%. Low damage levels were observed elsewhere in the Niagara District.

Low defoliation levels, averaging 15%, were recorded in a 10-ha red oak (*Quercus rubra* L.) stand in Uxbridge Township, Maple District.

In Cambridge District, 25% defoliation was observed in a 1-ha semimature stand of red oak at Bronte Creek Provincial Park. Average defoliation levels of 10% were found in 5-ha stands in North and South Dumfries townships and on scattered trees in the Robertson Tract of the Halton Regional Forest in Nassagaweya Township, Cambridge District. Trace levels of damage (<5% defoliation) were observed in Oro and Mulmur townships in Huronia District and at numerous points in the Niagara District.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Results of damage surveys, population sampling and egg-mass counts of the spruce budworm will be published with those of other regions at a much later date in a report devoted specifically to this insect. The report will provide a complete description and analysis of developments in the spruce budworm situation in Ontario in 1986 and will give infestation forecasts for the province for 1987.

Larch Casebearer, *Coleophora laricella* (Hbn.)

Population levels of this important pest of larch (*Larix* spp.) were down from those of 1985. Light-to-moderate defoliation (10-30%) was present in early summer on about 10 ha of European larch (*Larix decidua* Mill.) in West Gwillimbury Township, Huronia District, with the occasional tree within the stand sustaining 60% defoliation. Late-season feeding was evident at this site, with upper crown discoloration quite noticeable from Highway 400. Approximately 30% defoliation in the lower branches of some 12-m European larch was observed in Manvers Township, Lindsay District. Light damage (<10%) was seen on scattered larch in Innisfil and Vespra townships, Huronia District.

Oak Leaf Shredder, *Croesia semipurpurana* (Kft.)

There was very little change in the status of this pest in 1986. Minor reductions were noted in most areas examined in the region. The heaviest damage seen was in Uxbridge Township, Maple District, where defoliation levels averaged 25% in a couple of red oak stands. Trace levels of defoliation (1-5%) were found in numerous other areas of the Huronia and Niagara districts; in two stands in Awenda Provincial Park in the former district slightly higher levels were encountered (Table 1). This was only a marginal increase over last year's levels.

Samples of branches on which eggs had been laid were collected from 21 locations for 1987 defoliation forecasting (see Fig. 4) in three districts (Table 2). Generally, most of the counts remained the same or were lower than those of the previous year. A moderate defoliation level is forecast for one site in the Durham Regional Forest in Uxbridge Township, Maple District. This is the only location monitored in which noticeable damage is expected in 1987. The pheromone trapping of male moths (see photo page), which is still in the experimental stages, continued this year (Table 1). Numbers of adults captured varied over the two years, but it should be noted that so did the pheromone concentrations at many of the plots.

Birch Leaf Miner, *Fenusa pusilla* (Lep.)

Population levels of this leaf miner were unchanged in the region. A small group of white birch (*Betula papyrifera* Marsh.), about 10 trees in all, were very brown (100% foliar damage) at one location in Nassagaweya Township, Cambridge District. Individual browned trees were scattered throughout many other areas of the above district. Leaf mining was heavy (60-90%) on single trees in the Elmvale area in Flos Township, at CFB Borden, and in Mono Township, Huronia District. The incidence of trees attacked was high in the Maple and Niagara districts, particularly on ornamentals, but overall damage levels were low.

Fall Webworm, *Hyphantria cunea* (Dru.)

The frequency with which tents could be found was down from that of 1985. This hardwood insect feeds on a wide range of hosts but shows a preference for ash (*Fraxinus* spp.), elm (*Ulmus* spp.), cherry (*Prunus* spp.) and birch (*Betula* spp.). The highest populations were again present in the northeastern part of Huronia District. The heaviest concentration of insects found was in Medonte Township along the Ingram Road where numerous tents were present on a range of hardwoods for about 3 km on both sides of the road. Numerous tents were present on a small group of about six trees along County Road 60 as well as on some scattered trees in the village of Wyevale, both in Tiny Township, Huronia District. Populations were down in Lindsay and Niagara districts, with

Table 1. Results of oak leaf shredder pheromone trapping in three districts in 1986.

| Location | Plot no. of property owner | Total moths captured and pheromone concentration (%) 1985 | 1985 | Avg no. per trap 1986 | 1986 Defoliation (%) |
|---|---|---|---|---|---|
| **Huronia District** | | | | | |
| Awenda Provincial Park | 4 | 541(.03) | 239(.03) | 48 | 13 |
| | 5 | 96(.003) | 12(.003) | 2 | 1 |
| | 11 | 551(.3) | 123(.003) | 25 | 14 |
| Dufferin County Forest | 3 | 35(.3) | 8(.003) | 2 | 2 |
| | 9 | 46(.003) | 20(.003) | 4 | 4 |
| | 10 | 187(.03) | 142(.03) | 28 | 3 |
| | 12 | 3(.03) | 8(.003) | 2 | 2 |
| | 95 | 51(.003) | 15(.03) | 3 | 2 |
| | Check 3 | 176(.3) | 65(.03) | 13 | 5 |
| Hendrie | 1 | 43(.003) | 9(.003) | 2 | 3 |
| Midhurst | 1 | 8(.003) | 6(.03) | 1 | 1 |
| Orr Lake Tract | Danials | 88(.003) | 33(.03) | 7 | 1 |
| Wildman Tract | 4 | 319(.03) | 50(.003) | 10 | 2 |
| | 7 | 217(.3) | 36(.03) | 7 | 2 |
| **Maple District** | | | | | |
| Uxbridge Twp | 1 | 823(.03) | 712(.003) | 142 | 29 |
| | 2 | 1,042(.3) | 1,112(.03) | 222 | 23 |
| **Niagara District** | | | | | |
| Cayuga Twp | 1 | 18(.3) | 1(.003) | 0.3 | 1 |
| Town of Thorold | 6 | 273(.3) | 56(.003) | 11 | 1 |
| Town of Pelham | 5 | 53(.003) | 125(.03) | 25 | 1 |
| | 7 | 7(.003) | 0(.03) | 0 | 1 |
| West Lincoln Twp | 2 | 27(.3) | 28(.03) | 6 | 1 |

Table 2. Summary of oak leaf shredder egg counts and defoliation forecasts for three districts in 1986.

| Location | Plot no. of property owner | Mean no. of eggs per 38-cm sample | | Defoliation forecast for 1987[a] |
|---|---|---|---|---|
| | | 1985 | 1986 | |
| **Huronia District** | | | | |
| Awenda Provincial Park | 4 | 4.5 | 1.1 | L |
| | 5 | 0.2 | 0.0 | N |
| | 11 | 0.8 | 0.0 | N |
| Dufferin County Forest | 3 | 0.1 | 0.0 | N |
| | 9 | 0.8 | 0.1 | L |
| | 10 | 0.5 | 0.2 | L |
| | 12 | 0.0 | 0.0 | N |
| | 95 | 0.4 | 0.1 | L |
| | Check 3 | 1.2 | 0.2 | L |
| Hendrie | 1 | 0.1 | 0.2 | L |
| Midhurst | 1 | 0.0 | 0.0 | N |
| Orr Lake Tract | Danials | 0.1 | 0.0 | N |
| Wildman Tract | 4 | 0.9 | 0.2 | L |
| | 7 | 0.5 | 0.1 | L |
| **Maple District** | | | | |
| Uxbridge Twp | 1 | 8.6 | 8.9 | M |
| | 2 | 12.8 | 6.0 | L |
| **Niagara District** | | | | |
| Cayuga Twp | 1 | 0.0 | 0.1 | L |
| Town of Thorold | 6 | 0.3 | 0.5 | L |
| Town of Pelham | 5 | 0.1 | 0.1 | L |
| | 7 | 0.0 | 0.8 | L |
| West Lincoln Twp | 2 | 0.0 | 0.5 | L |

[a] N = nil, L = low, M = moderate

moderate defoliation (30-60%) in Otonabee and Belmont townships in the former district and only two tents seen along a 10-km stretch of the Niagara Parkway in the latter district. Individual colonies were present on a variety of hosts throughout the remainder of the region, albeit a little more frequently in Puslinch and North Dumfries townships, Cambridge District.

Gypsy Moth, *Lymantria dispar* (L.)

A marked increase in the area of defoliation in Lindsay District was noted this year. Heavy defoliation, averaging 75%, was mapped over about 630 ha of mixed hardwood bush along the east side of Haldimand Township (Fig. 1). Again this year, 188 ha of mainly scrub red and bur oak (*Quercus macrocarpa* Michx.) sustained heavy defoliation in the northern part of Belmont Township, Lindsay District. Although trace numbers of larvae were observed at several locations in Lindsay and Niagara districts (Fig. 1), there was no noticeable defoliation. In addition to those in the aforementioned districts, a few larvae were found at Bronte Creek Provincial Park, Cambridge District, and pupal cases were found in Huronia District at McRae Point Provincial Park (Table 3).

Moth catches were higher this year at all of the trapping sites and all traps retrieved had moths in them (Fig. 1). The parks in Huronia and Maple districts as well as a couple in Lindsay District showed the highest increases (Table 3). A pheromone trapping program monitored by OMNR personnel of Niagara District has disclosed the presence of male moths in all townships of the district.

Egg surveys were conducted in conjunction with OMNR at four sites in the Lindsay District. High numbers of egg masses were found in Belmont and Haldimand townships. The heavy infestation is expected to continue in 1987 within certain areas of these two townships. Under the burlap traps two egg masses were found at McRae Point Provincial Park, Huronia District, and one egg mass was found at Bronte Creek in Cambridge District. A search in the surrounding areas of these two sites was carried out, but no further eggs were found. Individual egg masses were also found by OMNR and University of Guelph personnel in Mono Township near Mono Centre, Huronia District, and in East Gwillimbury Township near Mount Albert, Maple District.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Population levels remained much the same as they had been in 1985. The only area in which significant numbers of larvae were found was again in and around Six Mile Lake Provincial Park in Baxter Township, Huronia District. Low defoliation levels (<10%) were observed on some small, scattered trembling aspen (*Populus tremuloides* Michx.) and red oak in the park, and caterpillars were easily found elsewhere in the

# CENTRAL REGION

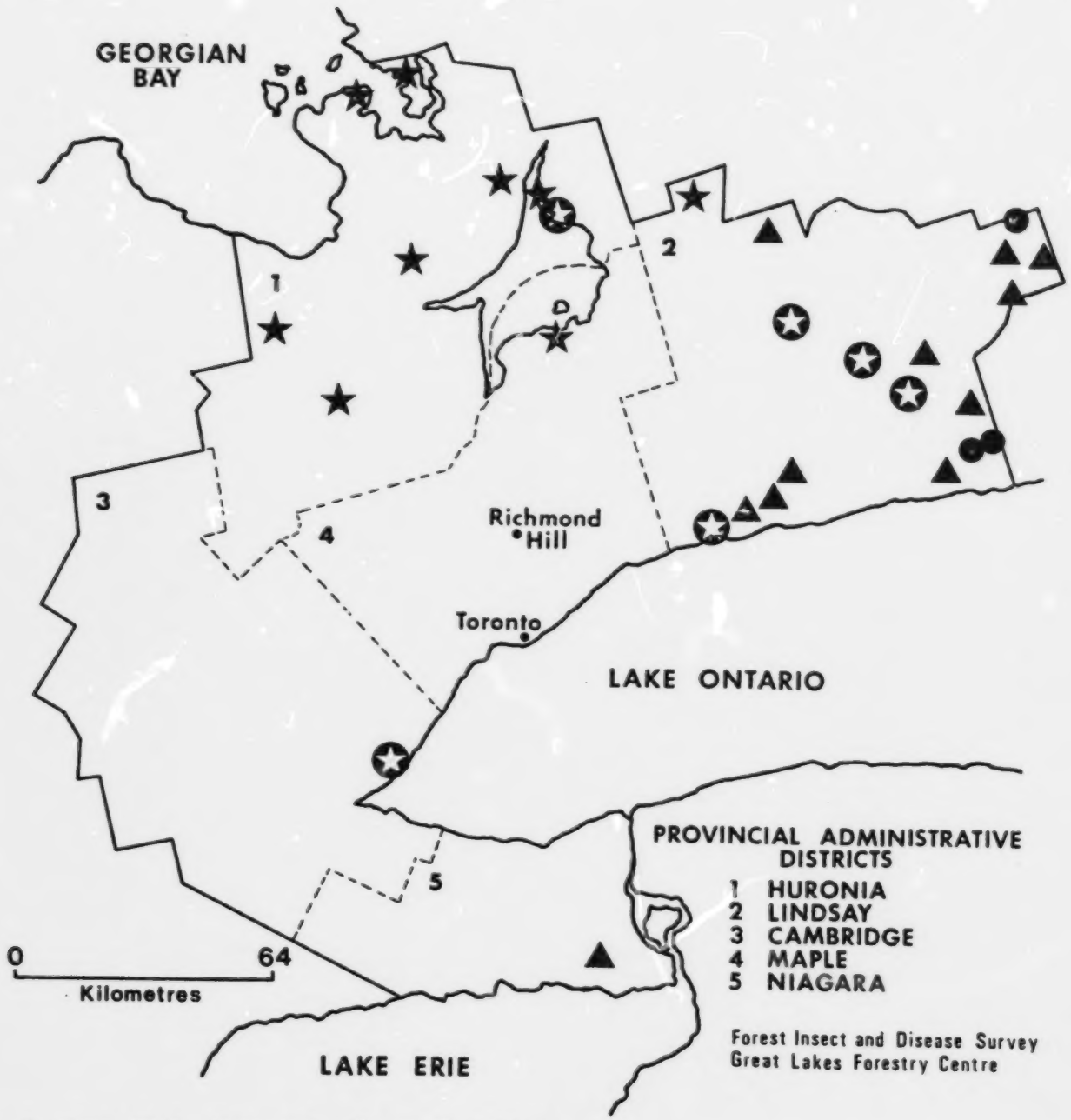



Figure 1. Gypsy Moth, *Lymantria dispar* (L.) 1986

Moderate-to-severe defoliation.....●

Trace larval populations.....▲

Pheromone trap locations:
Moths captured.....★

Moths and trace larvae.....✪

Table 3. Summary of gypsy moth pheromone and burlap trappings in 1986.

| Location (Park) | No. of burlap traps | No. of larvae caught | No. of pheromone traps | No. of moths caught | |
|---|---|---|---|---|---|
| | | | | 1985 | 1986 |
| **Cambridge District** | | | | | |
| Bronte Creek | 10 | 3 | 2 | 26 | 29 |
| **Huronia District** | | | | | |
| Awenda | 10 | 0 | 2 | 1 | 58 |
| Bass Lake | 10 | 0 | 2 | 4 | 34 |
| Devil's Glen | 10 | 0 | 2 | 0 | 21 |
| Earl Rowe | 10 | 0 | 2 | 0 | 15 |
| Mara | 10 | 0 | 2 | 2 | 24 |
| McRae Point | 10 | 4[a] | 2 | 3 | 21 |
| Six Mile Lake | 10 | 0 | 2 | 1 | 29 |
| Springwater | 10 | 0 | 2 | 1 | 33 |
| Wasaga Beach | 10 | 0 | 0[b] | 1 | 0[b] |
| **Lindsay District** | | | | | |
| Balsam Lake | 10 | 0 | 1 | 3 | 26 |
| Darlington | 10 | 24 | 2 | 37 | 46 |
| Emily | 10 | 2 | 2 | 11 | 36 |
| Mark S. Burnham | 10 | 0 | 2 | 40 | 41 |
| Serpent Mounds | 10 | 6 | 2 | 30 | 43 |
| **Maple District** | | | | | |
| Sibbald | 10 | 0 | 2 | 2 | 26 |

[a] pupae found

[b] traps removed, no results

area. Trace populations were found in Tay and Orillia townships, Huronia District and in Belmont Township, Lindsay District as well as four other scattered locations in the latter district.

As populations could increase in 1987 in the Parry Sound and Bracebridge districts, Algonquin Region, a special egg-band survey was carried out in the Huronia District. Light and moderate damage is forecast for 1987 at three locations in Tiny and Baxter townships (Fig. 2). Light forecasts are also predicted for one location in each of Flos and Mulmur townships, but very few eggs were found (Table 4) and it is doubtful if noticeable defoliation will result. At all of the other sites checked no eggs were found.

Redheaded Pine Sawfly, *Neodiprion lecontei* (Fitch)

Population levels of this insect were down in red pine plantations previously infested in Vespra, Rama, and Mara townships, Huronia District. However, there was one location at which heavy defoliation of a portion of a 2-m red pine windbreak occurred in Flos Township, Huronia District. This same site had also been also damaged in 1985 (see Frontispiece). Within this windbreak about 12 trees were 100% defoliated, 10 others had defoliation levels ranging from 40% to 100% and about 20 trees had levels up to 20%. In all, it was quite an impressive pocket of damaged trees. Very low populations, usually with only one insect colony present, were found at two plantations in Vespra Township, Huronia District and in Bexley, Haldimand and Clarke townships, Lindsay District. This insect was not observed elsewhere in the region.

# CENTRAL REGION

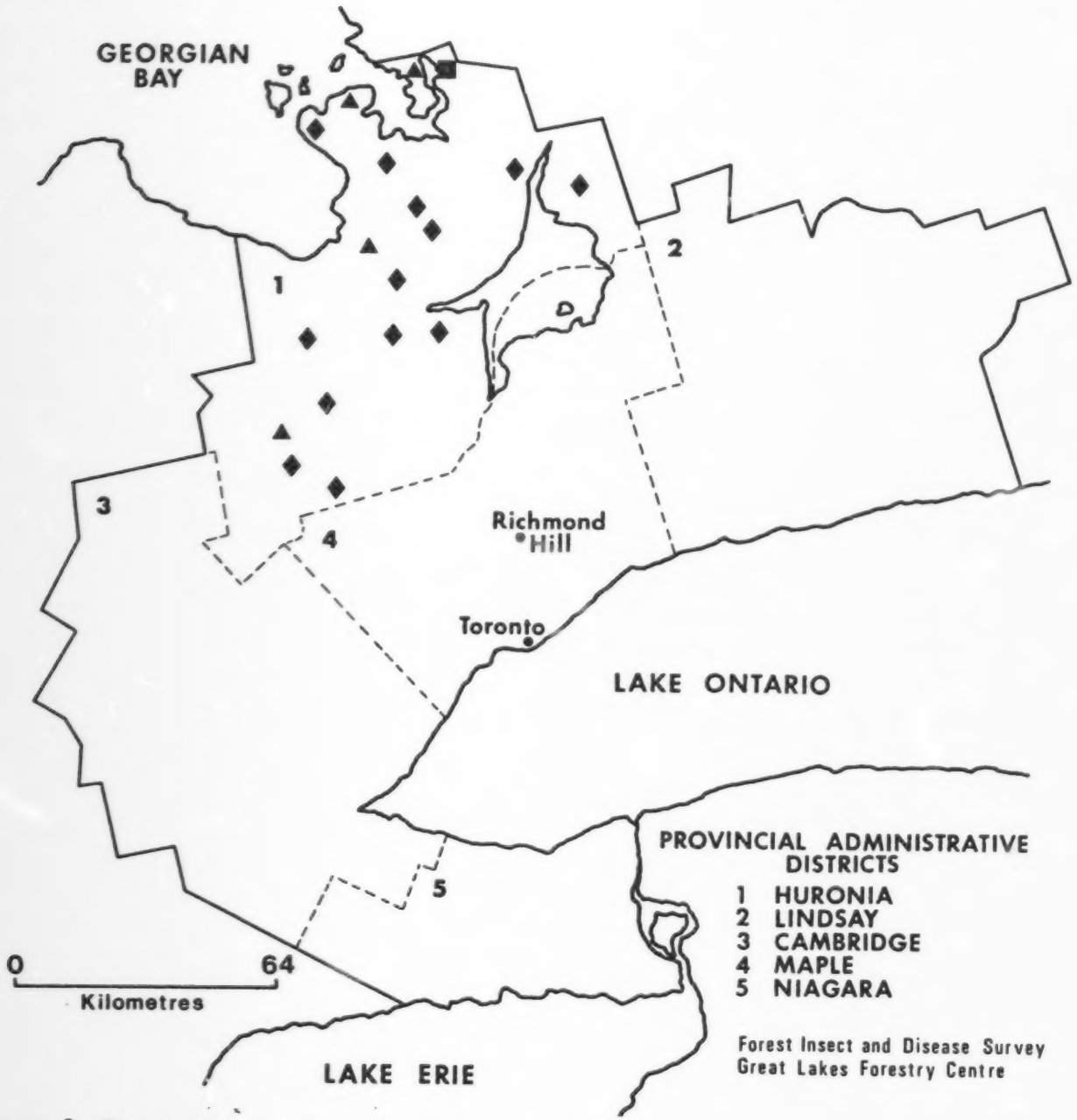



Figure 2. Forest Tent Caterpillar, *Malacosoma disstria* Hbn. 1986

Infestation forecast for 1987

Moderate..... ■

Light..... ▲

Nil..... ◆

Table 4. A summary of forest tent caterpillar egg-band counts done in the Huronia District in 1986, with infestation forecasts for 1987.

| Location (Twp) | Host | Avg DBH of trees (cm) | Avg no. of egg bands per tree | Infestation forecast for 1987[a] |
|---|---|---|---|---|
| Adjala | sM | 13 | 0 | N |
| Baxter | lA | 14 | 2 | M |
| Baxter-Six Mile Lake Provincial Park | tA | 13 | 1 | L |
| Essa | sM | 15 | 0 | N |
| Flos | tA | 16 | 1 | L |
| Innisfil | lA | 13 | 0 | N |
| Mara | lA | 14 | 0 | N |
| Medonte | sM | 13 | 0 | N |
| Mono | tA | 12 | 0 | N |
| Mulmur | sM | 11 | 1 | L |
| Nottawasaga | lA | 11 | 0 | N |
| Orillia | sM | 19 | 0 | N |
| Oro | sM | 17 | 0 | N |
| Tay | sM | 15 | 0 | N |
| Tiny-Awenda Provincial Park | lA | 18 | 1 | L |
| Tiny | sM | 15 | 0 | N |
| Tosorontio | sM | 15 | 0 | N |
| Vespra | lA | 16 | 0 | N |

[a] N = nil, L = light, M = moderate

*Minor Insects*

Eastern Tent Caterpillar, *Malacosoma americanum* F.

This early summer feeding insect was again very prominent in 1986. Some of the highest populations were observed in the northern half of the region in Huronia and Maple districts. Young cherry, the principal host, suffered 100% defoliation in most cases, with some large roadside and fencerow trees also stripped of their foliage (see photo page). Red oak was also infested on Beausoleil Island and in Baxter Township, Huronia District. Small, open-grown red and bur oak sustained moderate defoliation (50 to 75%) along Highway 36 in Harvey Township, and scattered cherry were stripped bare in Bexley Township, Lindsay District. Numerous tents were seen in the area south of Lake Simcoe in Maple District and at the southern end of the Lindsay District. Population levels were lower, but the insect was still common in the remainder of the region.

Bruce Spanworm, *Operophtera bruceata* (Hlst.)

A decline in population levels was observed in 1986. The only occurrence of this pest was in a 15-ha sugar maple (*Acer saccharum* Marsh.) stand in Oro Township, Huronia District. The understory had foliar damage levels of 10-30% and the lower branches of the larger trees had an average of 10% defoliation, with even less higher in the crowns. Damage caused by the early-season insect was not seen elsewhere in the region.

Maple Leafcutter, *Paraclemensia acerifoliella* (Fitch)

There was a noteworthy decline in population levels in 1986, especially in the Lindsay District. A 126-ha area of heavy defoliation mapped in 1985 was reduced to a nondescript area of light defoliation in Belmont Township, Lindsay District. Further reductions were observed, and as a result there was only a trace level of damage in a sugar maple stand in the Robertson Tract in Nagasagaweya Township, Cambridge District. Noteworthy damage was not seen anywhere else in the region.

White Pine Weevil, *Pissodes strobi* (Peck)

This insect was found more often in 1986 but population densities were lower than those of 1985. In Huronia District, 4% of the 1-m eastern white pine were damaged in the Glencairn Seed Orchard, where stocking was sparse, with only about 500 trees per ha. Only 2% of the leaders were damaged on the 1.5-m trees in a 5-ha eastern white pine plantation in Rama Township on the east side of Huronia District. Trace damage levels were observed on small groups of young eastern white pine in West Gwillimbury and Vespra townships, Huronia District. It should be noted by forest managers that this serious pest of pine also attacks Norway spruce (*Picea abies* [L.] Karst.)

Table 5. Other forest insects.

| Insect | Host(s) | Remarks |
|---|---|---|
| *Aceria* spp.<br>Mite | Wa | low numbers on several mature trees in South Cayuga Twp, Niagara District |
| *Acleris chalybeana* Fern.<br>Lesser maple leafroller | sM | trace levels on 25 understory trees in a 2-ha woodlot in Pelham, Niagara District |
| *Adelges abietis* (L.)<br>Eastern spruce gall adelgid | wS | 20 to 30 galls per 3-m tree on 15 ornamentals in Clarke Twp, Lindsay District |

(cont'd)

Table 5. Other forest insects.

| Insect | Host(s) | Remarks |
|---|---|---|
| *Agrilus anxius* Gory<br>Bronze birch borer | wB | In Bertie Twp. Niagara District, 4% of the open-grown ornamentals suffered 15% crown loss. |
| *Amphibolips confluenta* (Harr.)<br>Spongy oak apple gall | bO | numerous along the fringe of a fire guard in Northumberland County Forest, Haldimand Twp, Lindsay District |
| *Anisota finlaysoni* Riotte<br>Shorthorned oakworm | wO, bO | Six trees along a fencerow had 20-50% defoliation levels in Onondaga Twp and a couple of individual trees had 50% defoliation in Brantford Twp, Cambridge District. |
| *Cameraria hamadryadella* (Clem.)<br>Solitary oak leafminer | bO | severe defoliation on several roadside trees in Ontonabee Twp, Lindsay District |
| *Cecidomyia niveipila* Osten<br>Sacken gall midge | rO, bO | galls on new shoots of scattered individuals in Gainsborough Twp, Niagara District, and Baxter Twp, Huronia District |
| *Choristoneura pinus pinus* Free.<br>Jack pine budworm | jP | There was an endemic population in the region. As a result of egg-mass sampling, light infestation forecasts were made for two sites in each of Oro and Vespra twps, Huronia District. |
| *Cinara strobi* (Fitch)<br>White pine aphid | wP | A couple of 1.5-m trees had numerous colonies on them in Rama Twp, Huronia District. |
| *Coleophora ulmifoliella* McD.<br>Elm casebearer | sE, wE | high numbers on two trees in Seneca Twp, Niagara District and low numbers in North Dumfries Twp, Cambridge District |
| *Coleophora pruniella* Clem.<br>Cherry casebearer | birch | a trace population on a dozen roadside trees in King Twp, Maple District |
| *Coleotechnites piceaella* (Kft.)<br>Orange spruce needleminer | wS | A single hedgerow had 100% of the trees attacked but defoliation levels were 5% in Willoughby Twp, Niagara District |

(cont'd)

Table 5. Other forest insects (cont'd)

| Insect | Host(s) | Remarks |
|---|---|---|
| *Cryptococcus fagisuga* Lind.<br>Beech scale | Be | numerous insects on one large tree and low levels on others at Bronte Creek Provincial Park; trace levels in Erin Twp, Cambridge District and King Twp, Maple District |
| *Cryptorhynchus lapathi* (L.)<br>Poplar-and-willow borer | W, tA bPo | common in some small trees at Tree Seed Plant Nursery, Huronia District |
| *Datana integerrima* G. & R.<br>Walnut caterpillar | Wa | As a result of reductions in populations, there were no collections in Niagara or Cambridge districts. |
| *Dendroctonus valens* Lec.<br>Red turpentine beetle | rP | present on a couple of dead trees in Tiny Twp, Huronia District |
| *Dioryctria resinosella* Mut.<br>Red pine shoot moth | rP | numerous along Lisle Road, through CFB Borden, Huronia District |
| *Diprion similis* (Htg.)<br>Introduced pine sawfly | wP, scP | A 5-ha eastern white pine plantation had 76% of the 1.5-m trees attacked but defoliation levels of only 1% in Rama Twp, Huronia District. There were trace levels of second-generation insects on scattered Scots pine at CFB Borden, Huronia District and at Clairville Conservation Area, Maple District. |
| *Epinotia aceriella* (Clem.)<br>Maple trumpet skeletonizer | sM | a further reduction of the already low populations of 1985; only trace levels throughout the region |
| *Erannis tiliaria* (Harr.)<br>Linden looper | rO, wE | trace populations but no defoliation resulting in Tiny and Baxter twps, Huronia District |
| *Eriocampa ovata* (L.)<br>Woolly alder sawfly | European alder | very high numbers causing 50% defoliation on 6-m trees in Compartment 551 at Orono Forest Station, Lindsay District |

(cont'd)

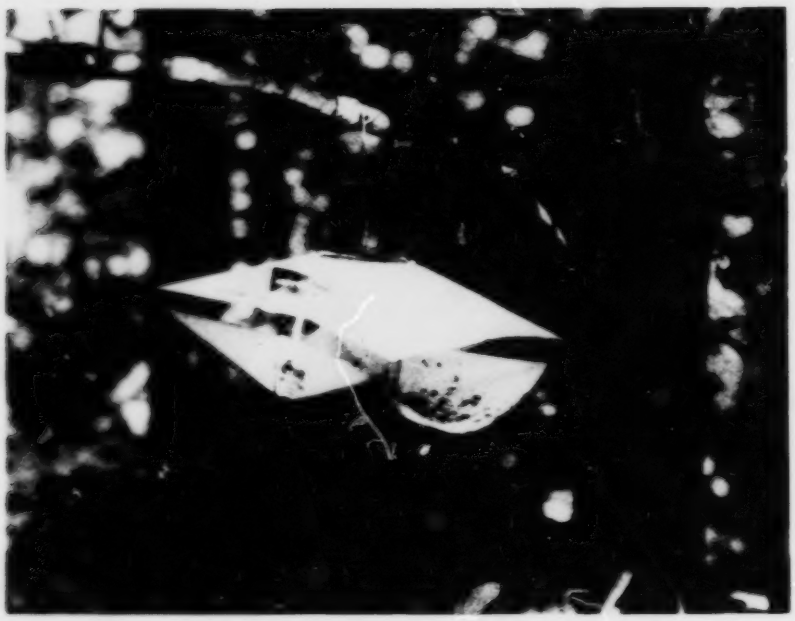
Table 5. Other forest insects (cont'd)

| Insect | Host(s) | Remarks |
|---|---|---|
| *Eriophyes* sp.<br>Gall mite | Be | high numbers of leaves heavily infested on understory in Stamford Twp, Niagara District, and to a lesser degree in Tiny Twp, Huronia District |
| *Fenusa dohrnii* (Tisch.)<br>European alder leafminer | Europpean & black alder | high populations at Orono Forest Station, Lindsay District, and in Caledon Twp, Maple District |
| *Fenusa ulmi* Sund.<br>Elm leafminer | rE | low numbers on scattered individuals along the Niagara Parkway, Stamford Twp, Niagara District |
| *Hylobius radicis* Buch.<br>Pine root collar weevil | scP | individual trees damaged at a few points in the Huronia District |
| *Neodiprion sertifer* (Geoff.)<br>European pine sawfly | rP | decreased populations in 1986; trace defoliation levels on 7% of the 1.3-m trees in an 8-ha plantation in Melancthon Twp, Huronia District |
| *Neuroterus* sp.<br>Oak gall wasp | bO, wO | high numbers on an ornamental in Pelham Twp and on several woodlot trees in Clinton Twp, Niagara District |
| *Oligonychus unungui*s (Jac.)<br>Spruce spider mite | spruce eC | common on ornamentals in the Waterloo-Cambridge areas of Cambridge District |
| *Phyllocolpa* sp.<br>Leaffolding sawfly | tA | a couple of trees full of insects at Six Mile Lake Provincial Park, Huronia District |
| *Pikonema alaskensis* (Roh.)<br>Yellowheaded spruce sawfly | colS wS | three trees with 70% defoliation and three with 20-40% defoliation levels in Tiny Twp; also a couple of ornamentals with light damage in Essa Twp, Huronia District |
| *Podapion gallicola* Riley<br>Pine gall weevil | rP | A couple of 20-m trees were attacked and there was some branch mortality in Vespra Twp, Huronia District; 17 8-m trees had high numbers (100+ per tree) in Haldimand Twp, Lindsay District. |

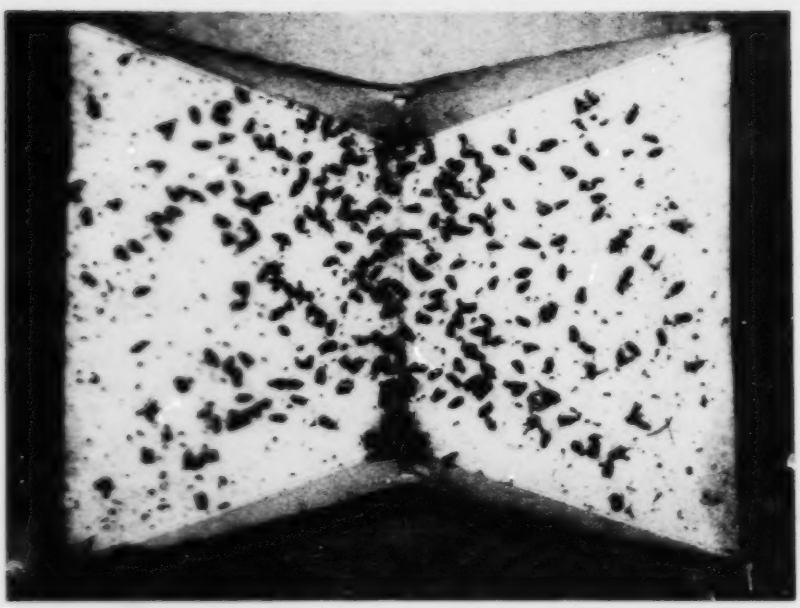
(cont'd)

Table 5. Other forest insects (concl.)

| Insect | Host(s) | Remarks |
|---|---|---|
| *Pristiphora geniculata* (Htg.)<br>Mountain-ash sawfly | Mo | very common on ornamentals in Darlington and Emily provincial parks and in the city of Lindsay, Lindsay District, and at a couple of sites in Huronia District |
| *Psilocorsis cryptolechiella* (Cham)<br>Twoleaf tier | bO | approximately 60% of the foliage damaged in a 10-ha mixed bush in Dummer Twp, Lindsay District |
| *Rhyacionia buoliana* (D. & S.)<br>European pine shoot moth | rP | 100% of the 2-m trees affected with about 20% of the terminals attacked in a 5-ha plantation in North Dumfries Twp, Cambridge District |
| *Rhynchaenus rufipes* (Lec.)<br>Willow flea weevil | W | heavy damage to 20 small trees at McRae Point Provincial Park, Huronia District |
| *Scolioneura betuleti* (Klug.)<br>A birch edgeminer | birch | moderate damage to half a dozen roadside trees in King Twp, Maple District |
| *Stegophylla* sp.<br>Oak aphid | bO | high numbers causing 15% foliar damage on 100% of the scattered individual trees examined in Thorold Twp, Niagara District |
| *Synanthedon pina* (Kell.)<br>Pitch mass borer | wP, wS | common on fringe trees in West Gwillimbury Twp, Huronia District, and at low levels in the eastern white pine seed orchard in Albion Twp, Maple District |
| *Tetralopha asperatella* (Clem.)<br>Maple webworm | sM | at low levels across the region |
| *Xerophylla caryaecaulis* (Fitch)<br>Globular hickory gall adelgid | sHi | low numbers in a woodlot in Bertie Twp, Niagara District |



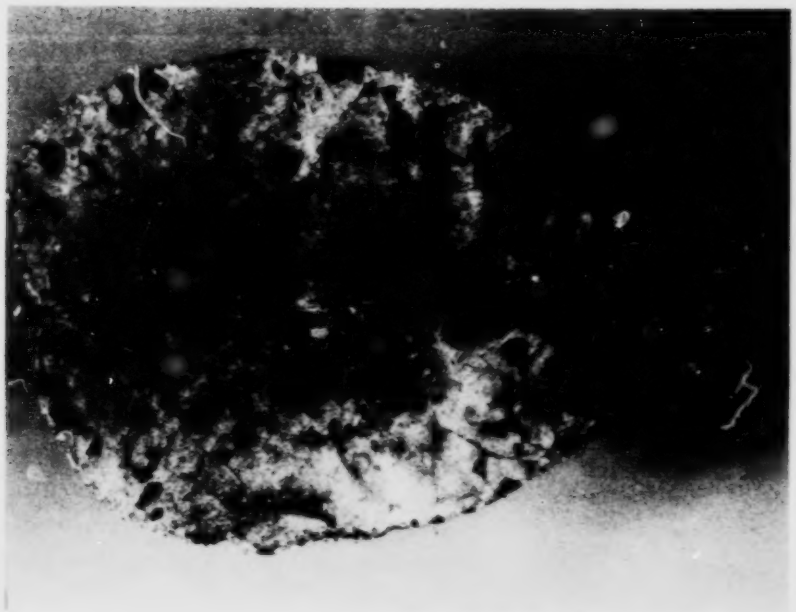
An oak leaf shredder, *Croesia semipurpurana* (Kft.), pheromone trap



Male oak leaf shredder moths caught on the sticky bottom section of a pheromone trap

Eastern tent caterpillar, *Malacosoma americanum* F., larvae on a tent

Damage to larger cherry (*Prunus spp.*) trees caused by eastern tent caterpillar



A balsam poplar (*Populus balsamifera* L.) leaf infected by septoria leaf spot, *Mycosphaerella populicola* G.E. Thompson

Roadside sugar maple (*Acer saccharum* Marsh.) showing various levels of dieback

## TREE DISEASES

### *Major Diseases*

Armillaria Root Rot, *Armillaria mellea* (Vahl:Fr.) Kummer

The frequency with which this common root rot fungus occurred was much the same as it had been in 1985. Low levels of mortality were seen in a small pocket of young red pine in Medonte Township and also in a few semimature trees in Tiny Township, Huronia District. This disease has also been responsible for killing numerous young white cedar windbreak trees at the Midhurst Forest Station. At a Christmas tree farm in Mulmur Township, Huronia District, a few dead white spruce (*Picea glauca* [Moench] Voss) and Scots pine were found over a 5-ha section from which red pine and scattered oak had been removed recently. Two distinct pockets of dead and dying trees <1 ha in size were observed at CFB Borden in Huronia District. One pocket had about five dead young eastern white pine, and the other was a little larger and had more trees infected, including red pine and largetooth aspen (*Populus grandidentata* Michx.). Mortality caused by this disease was commonly seen in red pine plantations in various tracts of Simcoe and Dufferin county forests, Huronia District, and York and Durham regional forests, Maple District.

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard

Numerous red pine stands were again surveyed this year for the European and North American races of this fungus. In all, 29 plantations ranging in height from 1 m to 21 m were examined on the ground across the region (Fig. 3). An aerial reconnaissance in which many of the larger concentrations of red pine were examined was carried out in May. If any damage was seen from the air it was later checked on the ground. Such things as root rot, lightning strikes and porcupine damage were common, but Scleroderris canker was not found.

Septoria Leaf Spot, *Mycosphaerella populicola* G.E. Thompson

There was a very high incidence of this foliage disease (see photo page) across the region in 1986. The host species, balsam poplar (*Populus balsamifera* L.), occurs mainly in small, scattered pockets <1 ha in size but sometimes in larger stands as well. Infested stands and individual trees were common, and most of the balsam poplar stands were infected. The highest infection levels were seen in Lindsay, Maple and Huronia districts. This late-season disease caused the foliage to turn brown and resulted in 100% defoliation in many cases. Damage levels were not as high in Cambridge and Niagara districts.

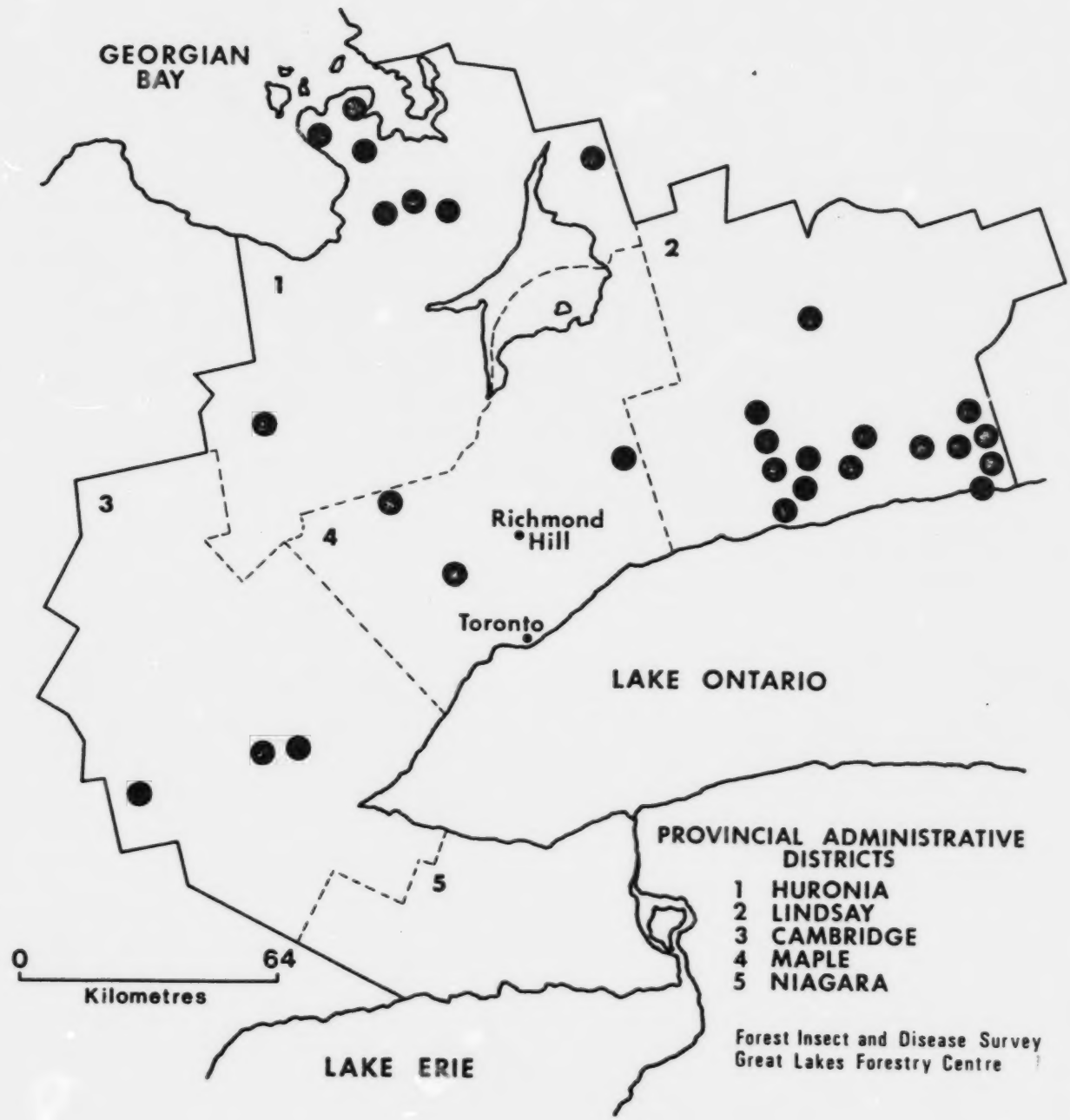



Figure 3. Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard.
Locations at which red pine plantations were surveyed in 1986.....●

Tip Blight, *Sphaeropsis sapinea* (Fr.) Dyko & B. Sutton

There was no change in the infection levels of this disease in 1986; however, it did appear more widespread in the region. Heavy damage was again present in Whitchurch Township, Maple District, with infection levels ranging from 75 to 100% in many of the remaining older Scots pine plantations. Stand conversion is being carried out where possible in Maple District to lower the disease incidence by removing Scots pine, the principal host species in the area. Heavy infection levels (75 to 100%) on Scots pine were also observed in Puslinch (4 ha) and Beverly (6 ha) townships, Cambridge District. As a result of this disease, mo tality levels have been about 50% in each township. Much lower damage levels were seen on a few fringe trees in Nassagaweya Township, Cambridge District.

In Lindsay District, 73% of the 30 roadside Austrian pine (*Pinus nigra* Arnold) were dead and dying in Eldon Township and 20 trees had 70% foliar damage levels in a small Austrian pine plantation in Manvers Township.

Low levels of damage (5-25%) were detected in Niagara District among clumps of scattered Austrian pine along the Niagara Parkway in Stamford Township and on a small group of mature red pine in Thorold Township.

Trace levels of foliar damage were observed on a few fringe Scots pine at CFB Borden and on a few Christmas trees in Essa Township, Huronia District.

Table 6. Other forest diseases.

| Organism | Host(s) | Remarks |
|---|---|---|
| *Asteroma caryae* (Peck) B. Sutton<br>Leaf spot of hickory | sHi | high incidence level with approximately 35% foliar damage in a mature 13-ha woodlot in South Cayuga Twp, Niagara District |
| *Apiognomia quercina* (Kleb.) Höhnel v. Arx<br>Anthracnose | rO, bl0 | very common on scattered trees in the Wasaga Beach area, Huronia District, and on ornamentals in Willoughby Twp, Niagara District |
| *Coleosporium asterum* (Dietel) Sydow<br>Pine needle rust | rP | Damage levels were down from those of 1985. Incidence was high (76%) but defoliation levels were 1% in plantations in Nottawasaga (6 ha) and Melancthon (8 ha) twps, Huronia District. |

(cont'd)

Table 6. Other forest diseases (concl.)

| Organism | Host(s) | Remarks |
|---|---|---|
| *Cronartium ribicola* J.C. Fischer White pine blister rust | wP | one dead tree in a 5-ha plantation in Rama Twp, Huronia District, and one in the seed orchard in Albion Twp, Maple District |
| *Cylindrocladium* sp. Root rot | wP | recovered from rising 2-0 stock in one compartment in Orono Forest Station, Lindsay District |
| *Gnomonia leptostyla* (Fr.) Ces. & de Not. Anthracnose | bWa, Bu | caused heavy defoliation throughout the region, particularly in Cambridge, southern Maple and Lindsay districts |
| *Guignardia aesculi* (Peck) Stewart Leaf blotch | horse chestnut | common on scattered individuals throughout the Niagara and Cambridge districts and at one site in the Lindsay District |
| *Gymnosporangium globosum* Farlow Globose gall rust | junipers hawthorn | very high infection levels particularly noticeable on the alternate host, hawthorn (*Crataegus* spp.), in Huronia, Cambridge and Niagara districts |
| *Hypoxylon mammatum* (Wahlenb.) J. Miller Hypoxylon canker | tA | low infection levels within small stands in Rama and Mulmur twps, and at CFB Borden, Huronia District |
| *Lophodermium* sp. Needle cast | rP | A 5-ha plantation had 98% of the trees affected and an average foliar damage level of 19% in Tiny Twp, Huronia District. |
| *Marssonina brunnea* (Ell. & Ev.) Magnus Marssonina leaf spot | cPo | heavy infection on individual trees and small groups of trees at a couple of sites in Huronia District |
| *Meria laricis* Vuill. Larch needle cast | European larch | A high incidence of infection was found in one compartment at the Orono Forest Station, Lindsay District. This is the first report of this fungus in a nursery in eastern North America. |

## DIEBACKS AND DECLINES

### Maple Dieback

Seven sugar maple stands scattered across the region (Fig. 4), three in Huronia District, two in Lindsay District, and one in each of Maple and Niagara districts, have been checked for the past couple of years for signs of dieback caused by such things as Eutypella canker, *Eutypella parasitica* Davidson & Lorenz. The sites were revisited this year, but there were no signs of unusual conditions that might cause tree decline. Decadent trees are common along major roadways at many points across the region (see photo page).

### Oak Decline

Red oak stands at five locations in the Huronia, Maple and Lindsay districts (Fig. 4) have been maintained for the past decade to monitor oak dieback (Table 7). Generally, the trees have outgrown decline conditions and most are now in the 0-20% category of crown dieback. Mortality rates increased slightly at two plots, but the remaining plots showed no increases. All plots were affected by oak leaf shredder, but only at trace and light levels, with the exception of the plot in Lindsay District, where insect damage was not found. Light damage (5-20%) by oak skeletonizer was observed on all the study trees in the Durham Forest plot in Maple District, and about half the trees in Mulmur Township, Huronia District had trace damage levels. Current dieback levels were negligible in all the plots.

# CENTRAL REGION

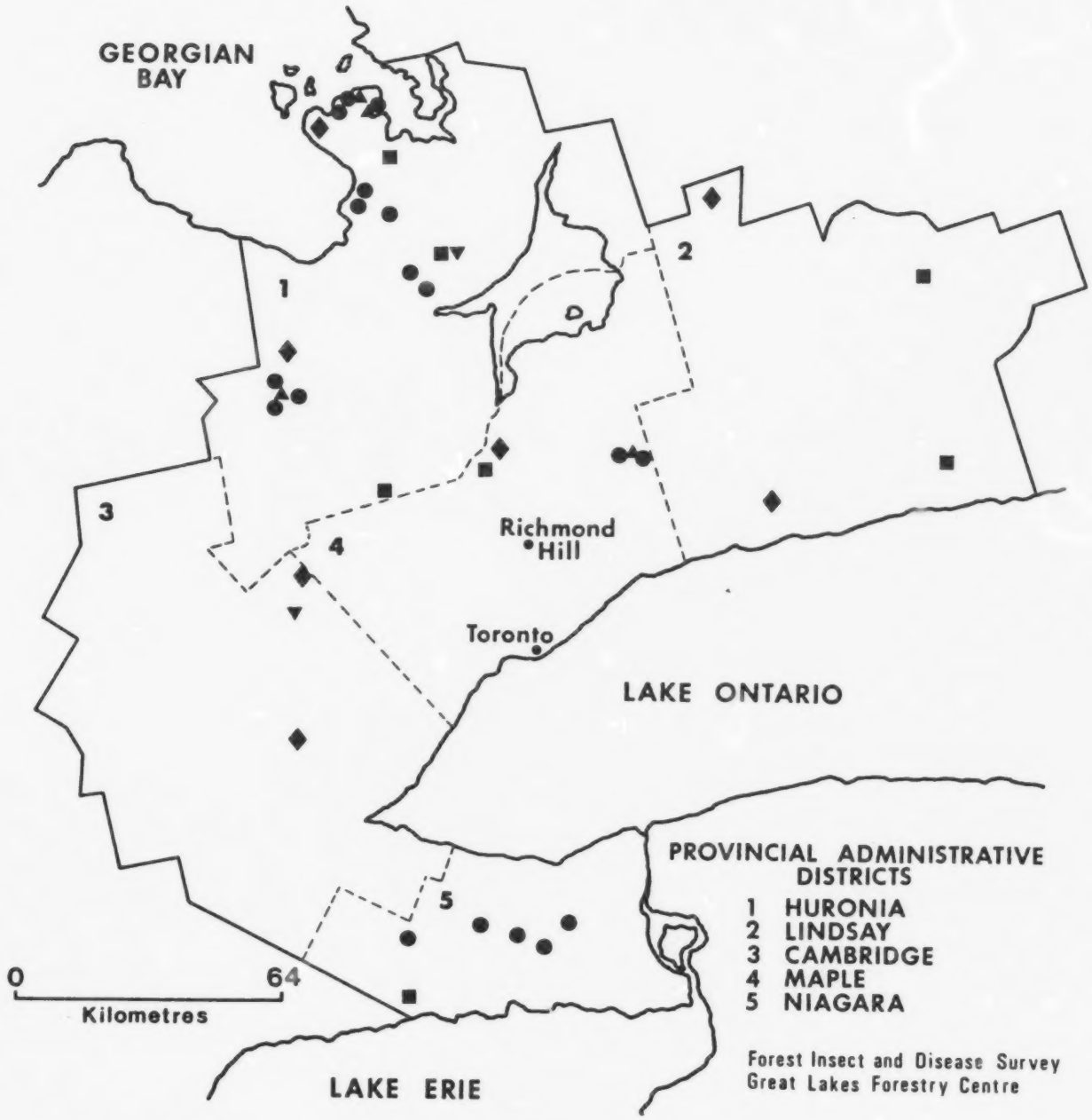



Figure 4. Study Plots 1986

Oak Leaf Shredder.....●

Oak Decline.....▲

Maple Dieback.....■

ARNEWS.....▼

White Pine Plantation..◆

Table 7. Summary of oak decline at five locations in the Central Region from 1977 to 1986.

| Location | Avg DBH (cm) | Avg ht (m) | Year | Percentage of crown dead 0-20 | 21-40 | 41-60 | 60 | No. of trees dead | Oak leaf shredder activity[a] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | - - - No. of trees - - - | | | | | |
| Huronia District | | | | | | | | | |
| Tiny Twp | 25.9 | 21.9 | 1977 | 54 | 7 | 27 | 12 | 0 | T[b] |
| Awenda Provincial Park | | | 1978 | 48 | 5 | 22 | 6 | 4 | T[b] |
| | | | 1979 | 58 | 9 | 3 | 4 | 8 | T[b] |
| | | | 1980 | 61 | 8 | 4 | 4 | 8 | T |
| | | | 1981 | 57 | 14 | 2 | 3 | 8 | T |
| | | | 1982 | 63 | 9 | 1 | 3 | 8 | T |
| | | | 1983 | 61 | 11 | 2 | 2 | 9 | T |
| | | | 1984 | 62 | 9 | 4 | 1 | 9 | T |
| | | | 1985 | 66 | 9 | 0 | 1 | 9 | T |
| | | | 1986 | 72 | 2 | 1 | 0 | 10 | T |
| Tiny Twp | 26.0 | 22.0 | | 1977-1979 | | - not sampled - | | | S |
| Farlain Lake | | | 1980 | 0 | 4 | 45 | 25 | 26 | S |
| | | | 1981 | 0 | 11 | 35 | 25 | 29 | L |
| | | | 1982 | 7 | 30 | 22 | 9 | 32 | L |
| | | | 1983 | 11 | 32 | 19 | 5 | 33 | L |
| | | | 1984 | 31 | 25 | 6 | 5 | 33 | T |
| | | | 1985 | 49 | 12 | 3 | 1 | 34 | T |
| | | | 1986 | 53 | 7 | 1 | 0 | 38 | T |
| Mulmur Twp | 28.2 | 21.0 | 1977 | 64 | 15 | 20 | 1 | 0 | S |
| Dufferin Forest | | | 1978 | 64 | 15 | 19 | 1 | 1 | L[b] |
| | | | 1979 | 68 | 15 | 15 | 1 | 1 | T |
| | | | 1980 | 57 | 28 | 13 | 1 | 1 | L |
| | | | 1981 | 43 | 34 | 16 | 2 | 1 | M |
| | | | 1982 | 44 | 39 | 10 | 1 | 2 | M[b] |
| | | | 1983 | 48 | 33 | 11 | 2 | 2 | L[b] |
| | | | 1984 | 53 | 33 | 6 | 0 | 4 | T |
| | | | 1985 | 71 | 19 | 2 | 0 | 4 | T |
| | | | 1986 | 90 | 2 | 0 | 0 | 4 | T |

(cont'd)

Table 7. Summary of oak decline at five locations in the Central Region from 1977 to 1986 (concl.).

| Location | Avg DBH (cm) | Avg ht (m) | Year | Percentage of crown dead 0-20 | 21-40 | 41-60 | 60 | No. of trees dead | Oak leaf shredder activity[a] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | - - - No. of trees - - - | | | | | |
| Maple District | | | | | | | | | |
| Uxbridge Twp | 26.1 | 21.2 | 1977 | 42 | 9 | 31 | 18 | 0 | M |
| Durham Forest | | | 1978 | 42 | 9 | 31 | 11 | 7 | L |
| | | | 1979 | 40 | 13 | 26 | 6 | 15 | M |
| | | | 1980 | 38 | 14 | 25 | 7 | 16 | L[b] |
| | | | 1981 | 27 | 22 | 26 | 6 | 19 | L |
| | | | 1982 | 29 | 33 | 12 | 6 | 20 | M |
| | | | 1983 | 33 | 31 | 9 | 4 | 23 | M |
| | | | 1984 | 40 | 27 | 6 | 3 | 24 | L |
| | | | 1985 | 53 | 17 | 4 | 1 | 25 | L |
| | | | 1986 | 62 | 12 | 1 | 0 | 25 | L |
| Lindsay District | | | | | | | | | |
| Clark Twp | 22.9 | 20.6 | 1977 | 38 | 11 | 32 | 19 | 0 | L |
| Durham Genaraska | | | 1978 | 4 | 36 | 39 | 13 | 8 | L |
| | | | 1979 | 3 | 32 | 41 | 16 | 8 | L |
| | | | 1980 | 2 | 26 | 47 | 16[c] | 9[c] | L |
| | | | 1981 | 2 | 26 | 47 | 16[c] | 9[c] | T |
| | | | 1982 | 1 | 32 | 44 | 14[c] | 9[c] | N |
| | | | 1983 | 5 | 57 | 26 | 3 | 9 | N |
| | | | 1984 | 76 | 10 | 2 | 2 | 10 | N |
| | | | 1985 | 66 | 19 | 2 | 2 | 11 | N |
| | | | 1986 | 66 | 16 | 5 | 2 | 11 | N |

[a] N = nil, T = trace, L = light, M = moderate, S = severe

[b] Aerially sprayed to control oak leaf shredder

[c] Data correction

## ABIOTIC DAMAGE

### Frost Damage

Daily minimum temperatures recorded by the Atmospheric Environment Service at Peterborough and Malton from 2 to 4 May ranged from -0.3° to -3.0°C. Frost-damaged trees were found occasionally in the Lindsay, Huronia and Maple districts. Across the northern portions of Lindsay District and at scattered sites in northeastern Huronia District, trembling aspen suffered various levels of damage, which gave the crowns a thin appearance. Most of the new growth was killed on about 40% of the red pine and eastern white pine in a 2-year-old 5-ha plantation in the Brentwood Tract in Sunnidale Township, Huronia District. Young red pine growing on low sites were also damaged in Albion Township, Maple District. Frost-damaged shoots were also found on white spruce in a Christmas tree plantation in Mulmur Township, Huronia District.

Table 8. Other abiotic damage.

| Type of damage | Host(s) | Remarks |
|---|---|---|
| Leaf scorch | sM | common at scattered locations in the western portion of the region |
| Salt | wP, rP | Damaged trees were common along major routes, especially where they grow close to the highway and are susceptible to the spray as well as the runoff. |
| Winter drying | rP, wP | About 20% of the 2-0 red pine in two compartments were lost at the Orono Forest Station, Lindsay District. Winter drying was also common along the edges of young plantations and on ornamentals elsewhere in the region. |

## SPECIAL SURVEYS

### Eastern White Pine Plantations

Once again, various age classes of high-value eastern white pine, ranging in height from 1 m to 16 m were examined in the region (Fig. 4). The most noteworthy insect pest was the white pine weevil, which was found at three sites. Moderate weevil damage to tree leaders was found in Bexley Township, Lindsay District, and there were lower levels of damage at a few other locations (Table 9). High numbers of trees affected by pine spittlebug, *Aphrophora cribrata* (Wlk.), were recorded at three locations; however, the impact on the trees appeared to be negligible. The pine false webworm was observed affecting a small number of trees at two sites but noteworthy defoliation did not result. The pine bark adelgid, *Pineus strobi* (Htg.), was found at low levels on 2% of the trees within a plantation in Tiny Township, Huronia District.

The only disease that had any impact in the plantations examined was white pine blister rust, which was found only at low levels at two sites (Table 9). Frost damage was also found affecting 15% of the trees in Nottawasaga Township, Huronia District, but the foliar damage level was only 1%. Porcupine feeding resulted in the death of one 6-m tree in Puslinch Township, Cambridge District.

In comparison with data collected from a similar survey done in 1983, this year's data indicated that pest levels were generally lower.

### Eastern White Pine Cone and Seed Pests

As part of a continuing host-specific pest survey carried out over the past several years, 100 green eastern white pine cones in their second year of development were collected. The collection was made in the Hendrie Tract in Vespra Township, Huronia District early in July, before the cones had started to harden and mature. A third of the cones were damaged and there was an average seed loss of 21%. Two noteworthy insects were found in the cones, the white pine cone beetle, *Conophthorus coniperda* (Schw.), and the white pine coneworm, *Eucosma tocullionana* Heinr. These insects were responsible for 12% and 8% of the cone damage, respectively. Also found in the damaged cones were a cone midge, *Resseliella* sp. (4%), and the spruce seed chalcid, *Megastigmus atedius* Wlk. (1%). In addition, 7% of the damaged cones were affected by unidentified Lepidoptera insects and other unknown agents. There were no disease organisms present in the cone sample.

Table 9. Summary of the results of an eastern white pine plantation survey carried out in the Central Regi... 1986.

| Location (Twp) | Avg ht of trees (cm) | Plantation area (ha) | Estimated trees/ha | Pine spittlebug | Pine false webworm | | White pine weevil | White pine blister rust | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Trees affected (%) | Trees affected (%) | Defoliation (%) | Leaders affected (%) | Trees affected (%) | Stem cankers (%) |
| **Cambridge District** | | | | | | | | | |
| Erin | 1.1 | 4 | 2,000 | 76 | 7 | 1 | 0 | 0 | 0 |
| Puslinch | 6.3 | 3 | 2,500 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Huronia District** | | | | | | | | | |
| Nottawasaga | 1.3 | 6 | 2,500 | 9 | 0 | 0 | 2 | 0 | 0 |
| Tiny | 16.0 | 4 | 2,000 | 0 | 0 | 0 | 0 | 0 | 1 |
| **Lindsay District** | | | | | | | | | |
| Bexley | 7.2 | 4 | 1,500 | 45 | 0 | 0 | 6 | 1 | 1 |
| Clarke | 1.6 | 4 | 1,500 | 91 | 8 | 1 | 1 | 0 | 1 |
| **Maple District** | | | | | | | | | |
| King | 2.8 | 5 | 2,200 | 0 | 0 | 0 | 3 | 1 | 0 |

Pinewood Nematode, *Bursaphelenchus xylophilus* (Steiner & Buhrer) Nickle

The pinewood nematode is known to cause a wilting condition in many conifer species, particularly those that are also host to the beetle vectors. The nematodes are transferred from tree to tree, primarily by some species of the family *Cerambycidea,* which contains long-horned beetles and roundheaded borers. The nematode affects the tree by multiplying rapidly in the sapwood of branches and main stems, thereby disrupting the flow of nutrients within the tree. There is reason to believe that nematodes are not the primary cause of tree mortality, but are a contributing factor along with various abiotic conditions, insects and diseases. The bulk of the sampling for pinewood nematode was carried out in 1985. Results were positive from red pine samples in Whitchurch Township, Maple District, Mulmur and Vespra townships, Huronia District and Manvers Township, Lindsay District, and from an eastern white pine in West Lincoln Township, Niagara District. Three samples were submitted in 1986; two did not contain pinewood nematode but the third, a resample of the Manvers Township plantation, was again positive. All trees sampled in which the nematodes were found were showing some sign of decline or were recently dead.

Acid Rain National Early Warning System (ARNEWS)

Because of concern over the possible impact acid rain may have on trees, the Forest Insect and Disease Survey now has 27 study plots in place across Ontario. These 400-$m^2$ plots are for the purpose of monitoring any effects of acid rain on the trees of various species found in the plots. There are two such plots in the Central Region (Fig. 4): one in a 70% sugar maple stand with an average height of 18 m in Oro Township, Huronia District, and the other in a 13-m eastern white pine plantation in Erin Township, Cambridge District. In 1986, white pine blister rust and pine bark adelgid were found in the Erin Township plot. The tree affected by blister rust was dead. The adelgid population was very low and was on only six trees. No noteworthy pest populations or damage were found in the plot in Huronia District.

Climatic Data

Extremes in some meteorological phenomena can have an impact on the forest, insect populations and disease development. Two conditions often related to abiotic damage on trees are temperature and precipitation. Table 10 lists mean monthly temperatures and total precipitation for 1986 as recorded by the Atmospheric Environment Service, with the deviation from a 30-year normal. There were no great temperature deviations from the normal in 1986; however, low temperatures in May did result in some frost-damaged trees (see Abiotic Damage). Precipitation levels were quite high in September, but it remains to be seen if this will have any impact on the forest.

Table 10. A summary of temperature and precipitation for 1986 at two locations in the Central Region.

| Location | Month | Mean temperature (0°C) | | Deviation from normal (°C) | Total precipitation (mm) | | Deviation from normal (mm) |
|---|---|---|---|---|---|---|---|
| | | Normal | Actual | | Normal | Actual | |
| Peterborough Airport | January | -9.3 | -8.5 | +0.8 | 44.1 | 50.2 | +6.1 |
| | February | -8.5 | -8.7 | -0.2 | 48.9 | 36.7 | -12.2 |
| | March | -2.5 | -0.8 | +1.7 | 62.9 | 82.5 | +19.6 |
| | April | 6.0 | 7.6 | +1.6 | 71.8 | 44.5 | -27.3 |
| | May | 12.1 | 13.9 | +1.8 | 57.1 | 76.0 | +18.9 |
| | June | 16.8 | 15.4 | -1.4 | 60.4 | 99.6 | +39.2 |
| | July | 19.2 | 20.0 | +0.8 | 77.9 | 59.8 | -18.1 |
| | August | 18.1 | 16.7 | -1.4 | 74.2 | 93.5 | +19.3 |
| | September | 14.0 | 13.3 | -0.7 | 72.9 | 178.4 | +105.5 |
| | October | 7.9 | 7.8 | -0.1 | 59.9 | 45.8 | -14.1 |
| | November | 2.1 | 0.3 | -1.8 | 69.4 | 37.4 | -32.0 |
| | December | -6.0 | -3.1 | +2.9 | 74.3 | 92.5 | +18.2 |
| Lester B. Pearson International Airport | January | -6.7 | -5.6 | +1.1 | 50.4 | 26.5 | -23.9 |
| | February | -6.1 | -6.1 | 0.0 | 46.0 | 32.0 | -14.0 |
| | March | -1.0 | 0.6 | +0.4 | 61.1 | 48.8 | -12.3 |
| | April | 6.2 | 7.6 | +1.4 | 70.0 | 54.0 | -16.0 |
| | May | 12.3 | 14.3 | +2.0 | 66.0 | 75.2 | +9.2 |
| | June | 17.7 | 16.4 | -1.3 | 67.1 | 67.4 | +0.3 |
| | July | 20.6 | 21.0 | +0.4 | 71.4 | 122.3 | +50.9 |
| | August | 19.7 | 18.4 | -1.3 | 76.8 | 146.2 | +69.4 |
| | September | 15.5 | 14.7 | -0.8 | 63.5 | 212.3 | +148.8 |
| | October | 9.3 | 8.7 | -0.6 | 61.8 | 54.8 | -7.0 |
| | November | 3.3 | 1.6 | -1.7 | 62.7 | 44.4 | -18.3 |
| | December | -3.5 | -1.2 | +2.3 | 64.7 | 67.3 | +2.6 |